ABSTRACT OF THE DISCLOSURE

An infrared absorption spectrometer features an optical microcavity, and a waveguide that evanescently couples light into the microcavity. The optical resonance frequency of the microcavity is tuned to coincide with an atomic or molecular resonance frequency of a selected atom or molecule. In this way, light coupled into the microcavity will experience absorption in the presence of an atomic or molecular subtance. The absorption causes a measurable change in the evanescent light coupling into the microcavity. The detection sensitivity of the spectrometer is significantly increased, compared to prior art spectrometers, because of the high Q value of the microcavity and the ensuing long optical path lengths of the resonant modes traveling within the microcavity.